

## Conservation Design Strategies and Practice



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### Native Plant Root Structure



### Soil Cross Section



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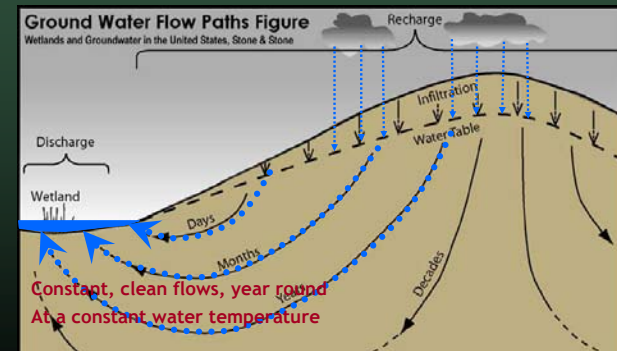
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## Historic Hydrology and Historic Wetlands

Recharge Zone: Uplands

Discharge Zones: Lowlands



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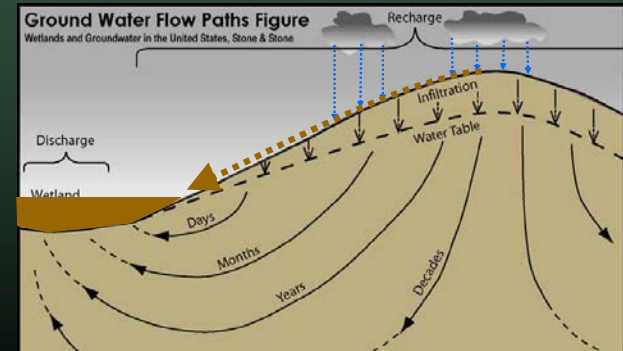
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## Mistaking Historic Wetlands for Constructed Wetlands

Upland becomes discharge zone

Wetlands are expected to function as recharge zones



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## *So What Can We Do?*



## Watershed Management Approach

- Protect Watershed Sensitive Areas with Regional Open Space/Green Infrastructure Plan
- Restore/Protect Hydrology at the Site Level
  - Site Planning
  - Distributed Stormwater Management
  - Landscape restoration
- Restore Watershed Resources
  - Streams
  - Lakes
  - Wetlands



## Sustainable Site Design Guiding Principles

- Protect & Buffer On-Site Natural Features
- Develop site plan to respect natural topography and drainage patterns
- Integrate native landscapes into site plan to reduce stormwater runoff and improve habitat & aesthetics
- Integrate stormwater systems into site plan
- Use Engineered stormwater systems based on natural processes
- Use Clustering to facilitate above principles





## Site Planning For Natural Resource Protection

- Identify sensitive areas
  - Floodplains (based on elevations in FEMA maps)
  - Wetlands (NWI maps)
  - Hydric soils (County soil survey)
  - Streams & Wetland buffers (local regulations)
  - Steep slopes
  - Remnant prairie & woodland landscapes (aerial photography, on-site investigation)

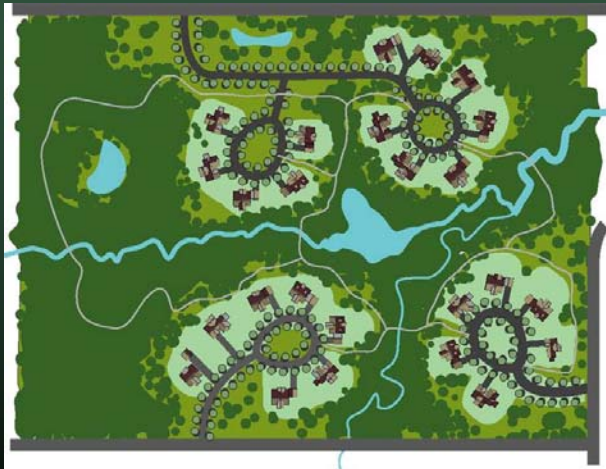


LEGEND (overlay)

Natural Drainageways and  
Associated Vegetation  
Steep Slopes

Woodland Dense  
Understory  
Erodible Soils

MN Pollution Control Agency



## Integration of BMPs into Site Plan

- Preserve natural drainageways
- Integrate open space throughout development
- Drain impervious runoff to pervious areas



Distributed Stormwater System





Conventional  
Moderate  
Density  
Residential...

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Conservation  
Moderate  
Density  
Residential...

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## Rural Residential Conservation Design Template



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## Commercial Conservation Design Template



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## Distributed Stormwater Management Techniques

- Residential Yards
- Streets
- Roofs
- Parking Lots
- Landscape Restoration
- Naturalized Detention

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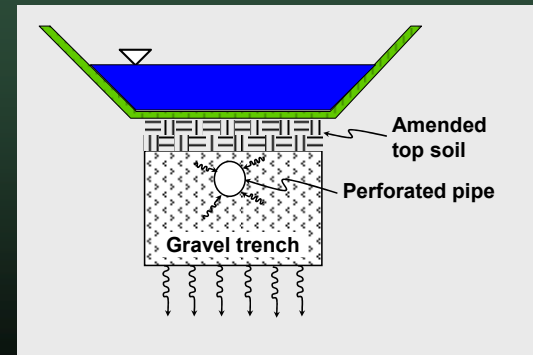




Maplewood, MN



## RAIN GARDEN CROSS-SECTION



Portland Stormwater Management Manual



## Street Drainage

### Conventional



### Conservation



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## Street Drainage

### Conventional



### Conservation



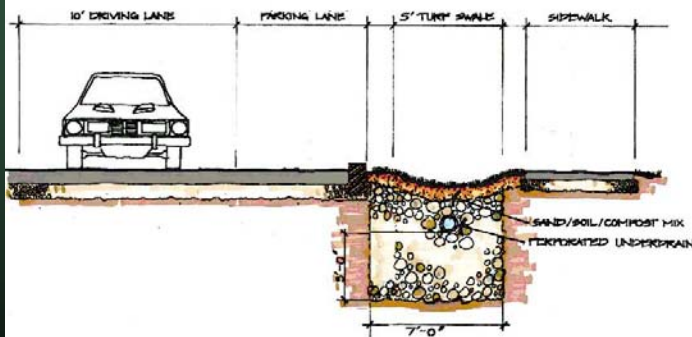
Seattle SEA Streets

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## Blackberry Creek Water Infiltration Concepts



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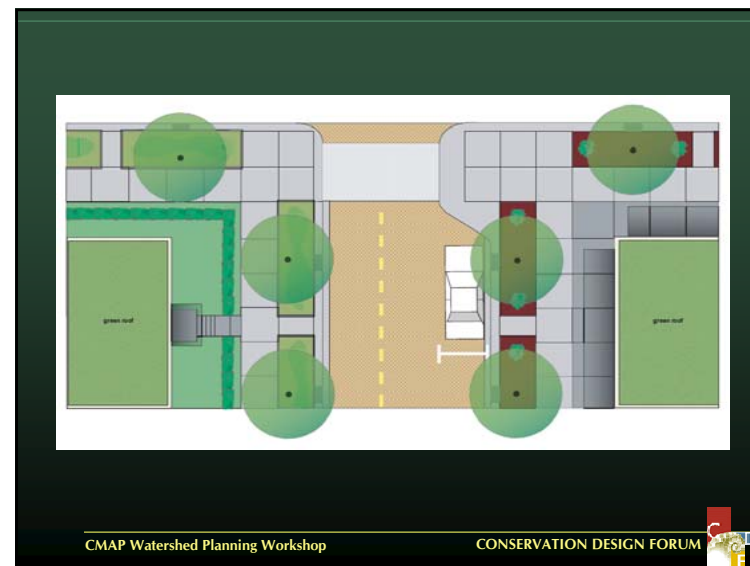
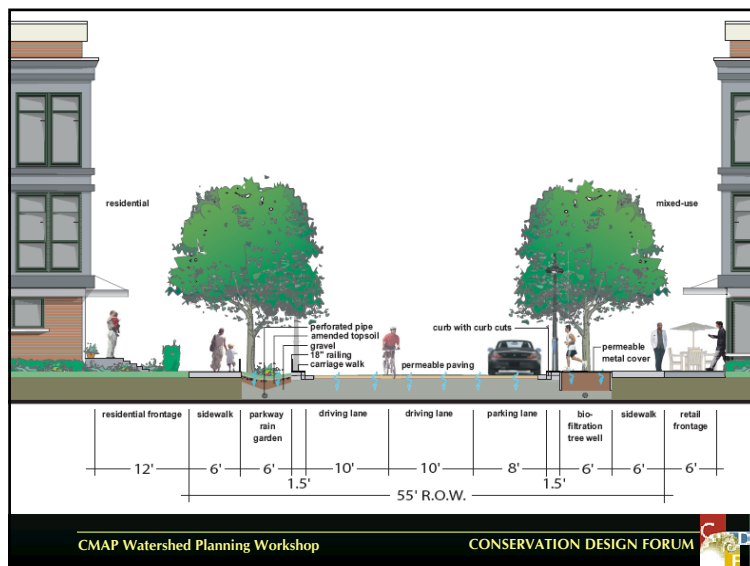


## Portland Curb Extensions



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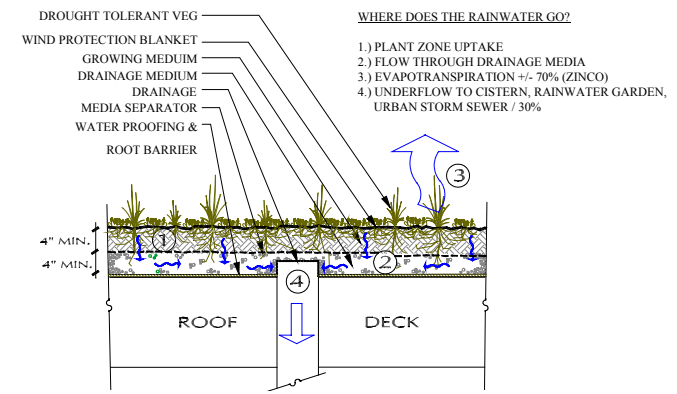
# Roof Runoff Management



Portland Stormwater Management Manual



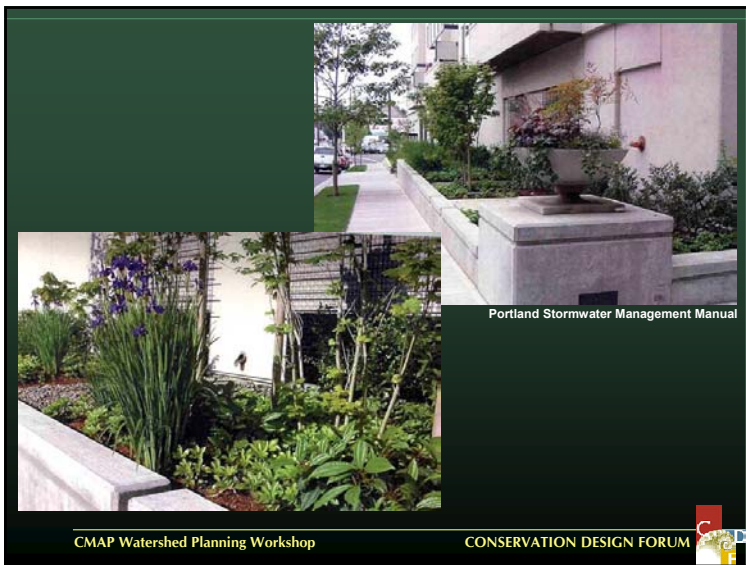
Chicago City Hall



GREEN ROOF CROSS SECTION







## Parking Lot Runoff Management

### Conventional



### Conservation



USACE Rock Island Arsenal

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## Porous Pavement

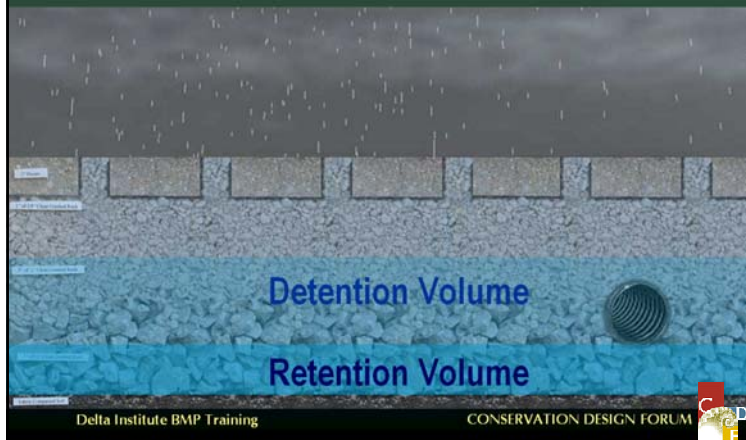




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## Porous Pavement: Infiltration (Retention) and Detention Capacity



## Parking Lot Islands

Conventional

Conservation



Tellabs, Naperville

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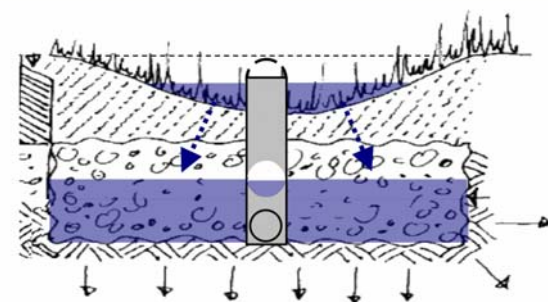
Morton Arboretum



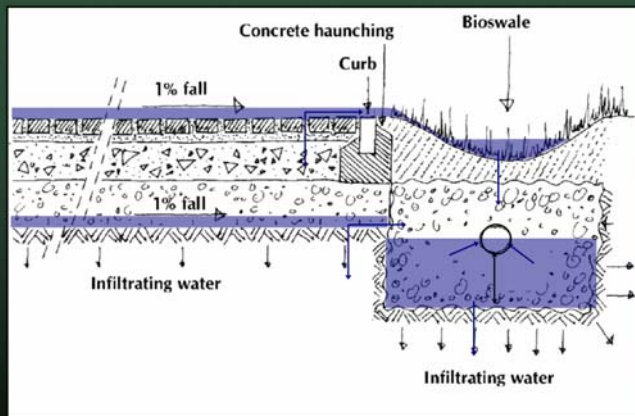
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## Rain Garden Section



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Low Impact Development Workshop

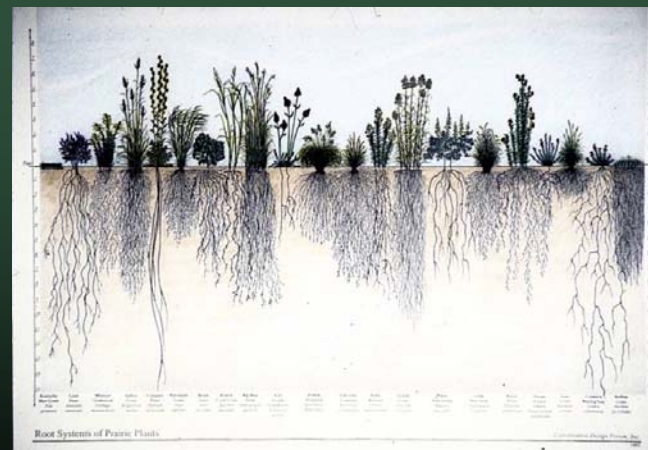
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Waubensee Community College

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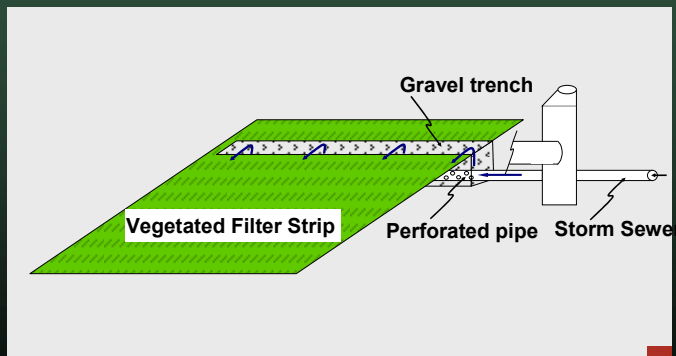
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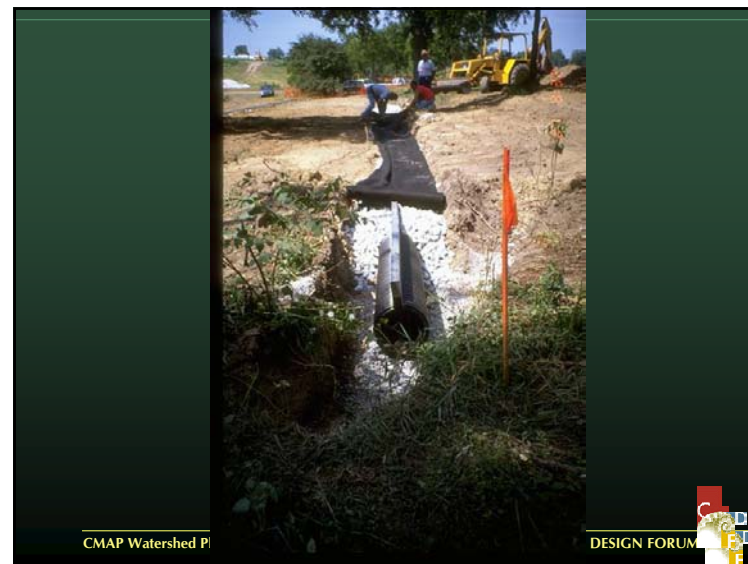


# FILTER STRIP LEVEL SPREADER



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## Naturalized Detention

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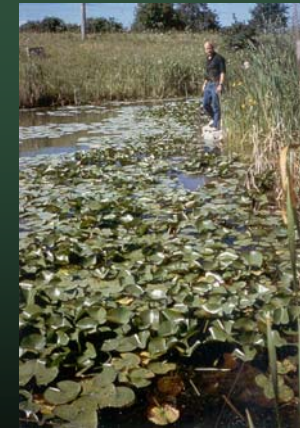
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November 1, 2001

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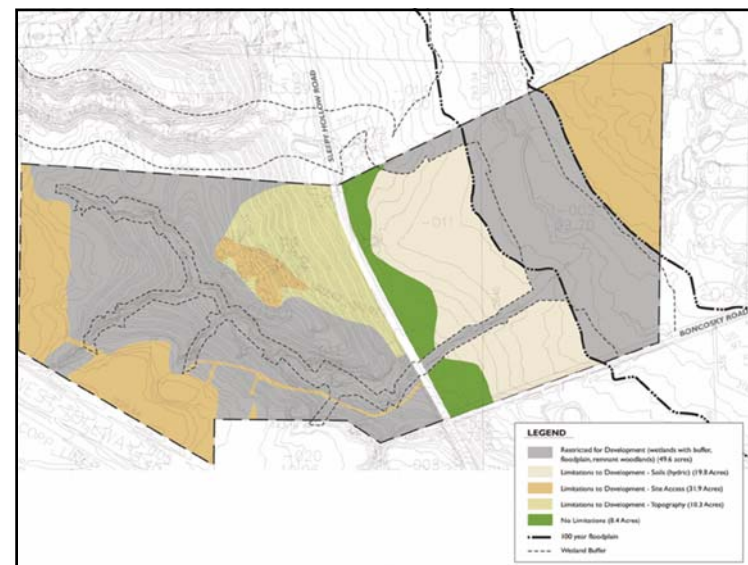
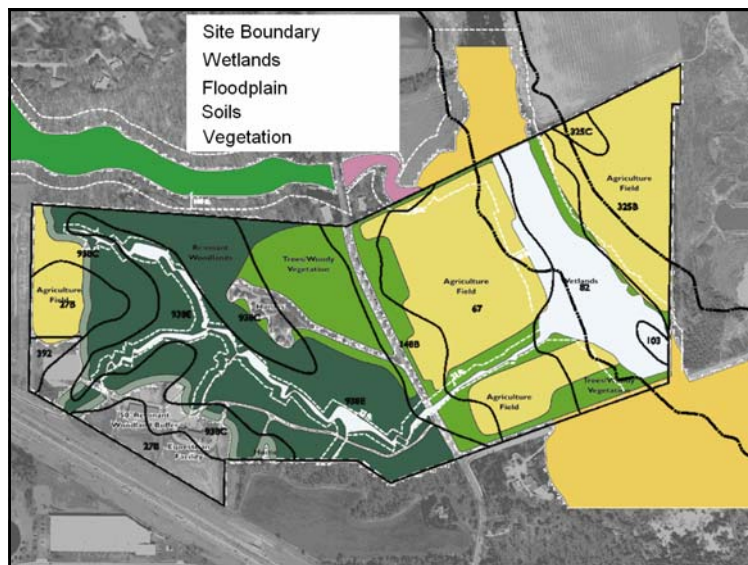


## Example Projects

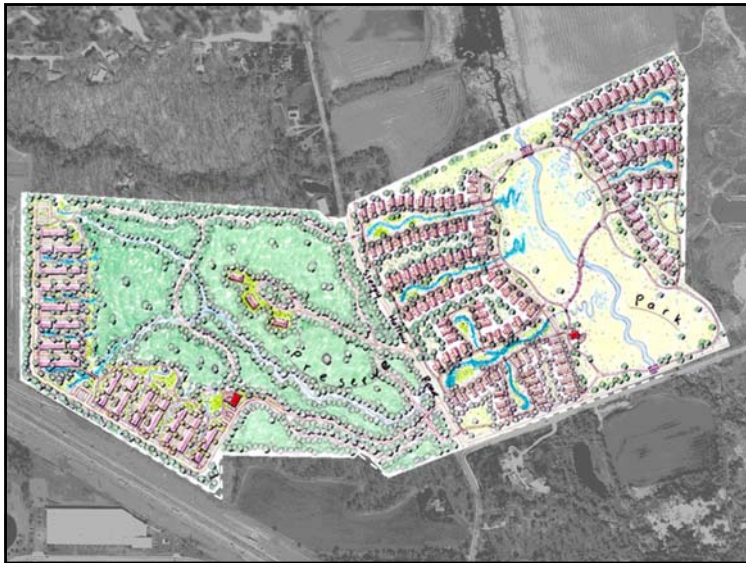


## Kane County Development Site Planning

- Identify sensitive areas
- Establish development and restricted areas
- Prepare Site Plan







## Villa Park Green Police Station

Villa Park Engineering Department  
Villa Park, Illinois

Conservation Design Forum, Inc.  
Elmhurst, Illinois  
[www.cdfinc.com](http://www.cdfinc.com)



This project was funded, in part, by U.S. Environmental Protection agency funds under Section 319 of the Clean Water Act distributed and administrated through the Illinois Environmental Protection Agency

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## Pre-Project Conditions

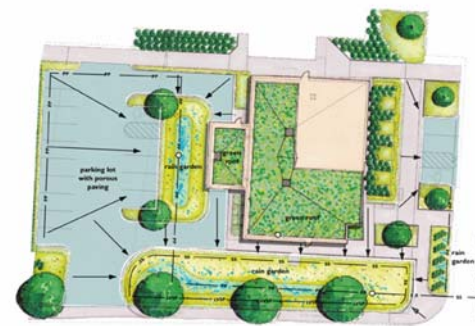


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Field Tested Permeability Rate for Site: 0.3 in/hr  
Allowable release rate: 0.1 cfs/acre  
Site: 0.72 acres

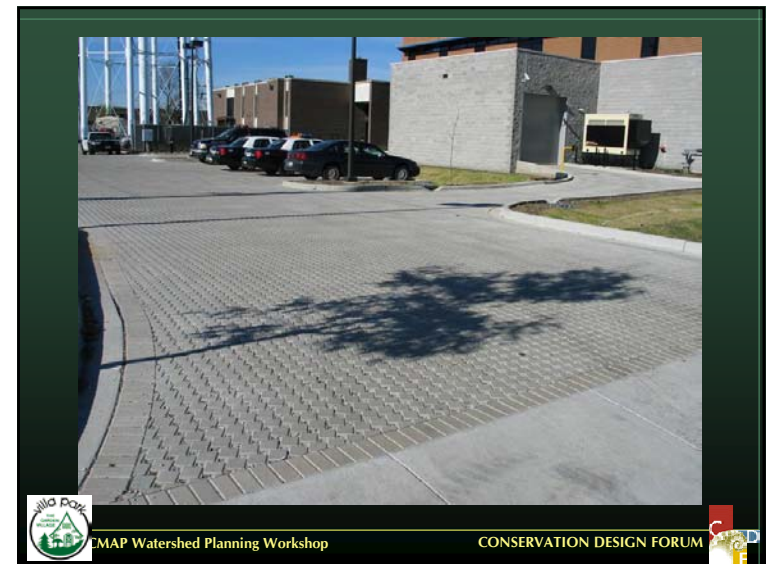


**Green Roofs  
Porous Pavement  
Rain Gardens**



Villa Park Police Station Sustainable Stormwater Design









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## Estimated Project Performance

Event	24-hour Rainfall	Existing Conditions	Proposed Conditions
1-yr Flow		0.9 cfs	0.00 cfs
2-yr Flow		1.2 cfs	0.01 cfs
100-yr Flow		4.4 cfs	0.07 cfs
1-yr Runoff	2.51"	1.97"	0.02"
2-yr Runoff	3.04"	2.49"	0.14"
100-yr Runoff	7.58"	6.98"	2.50"

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### Josey Heights Milwaukee, WI

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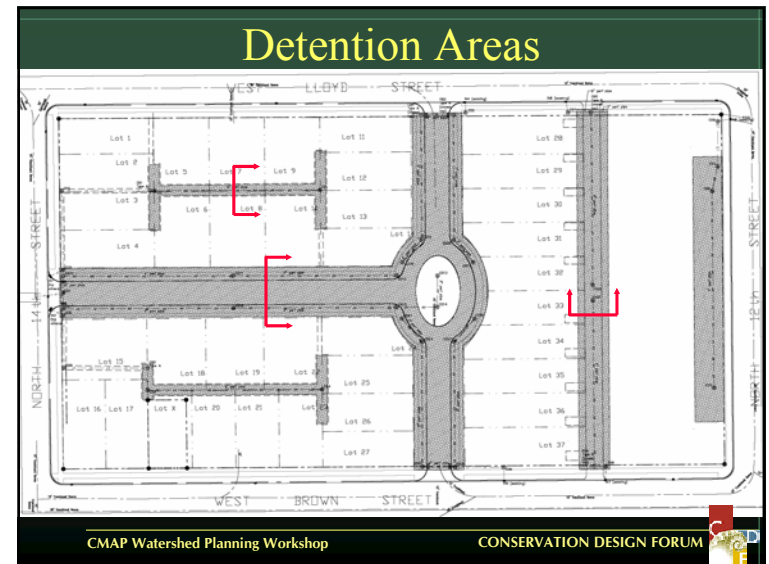
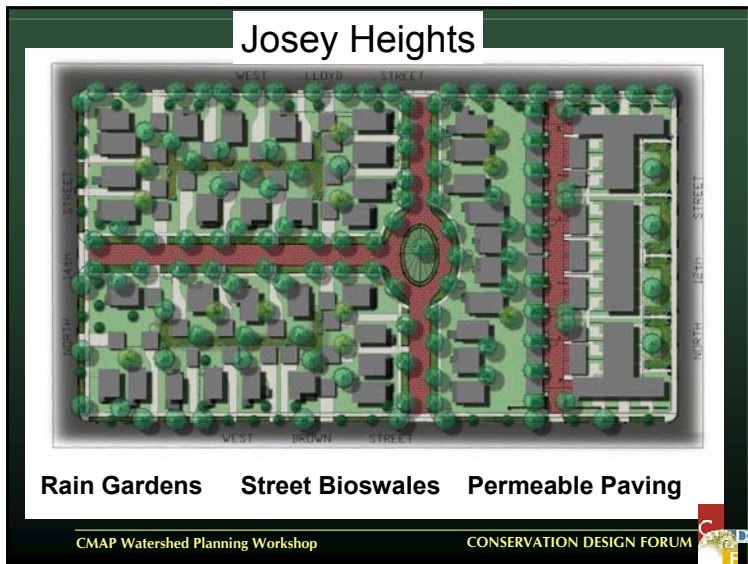
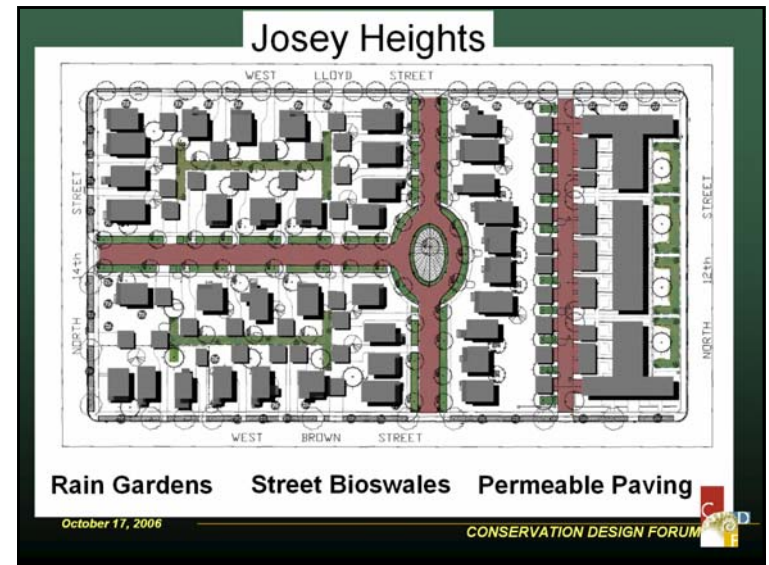
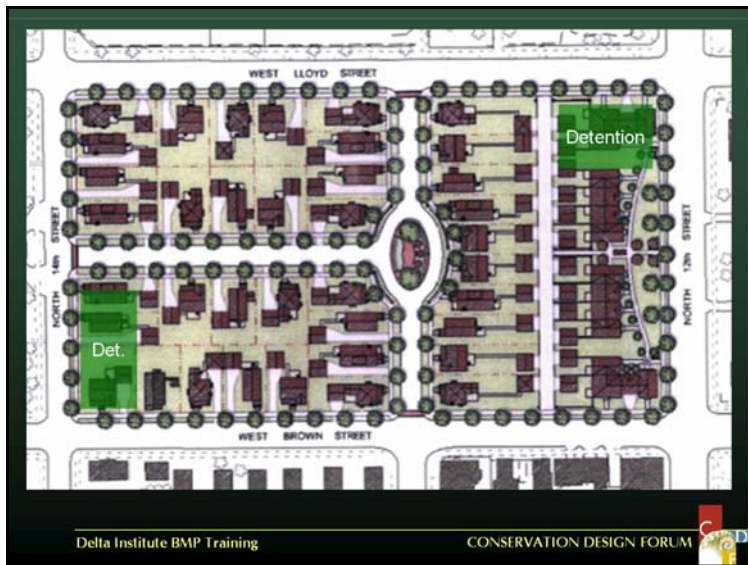
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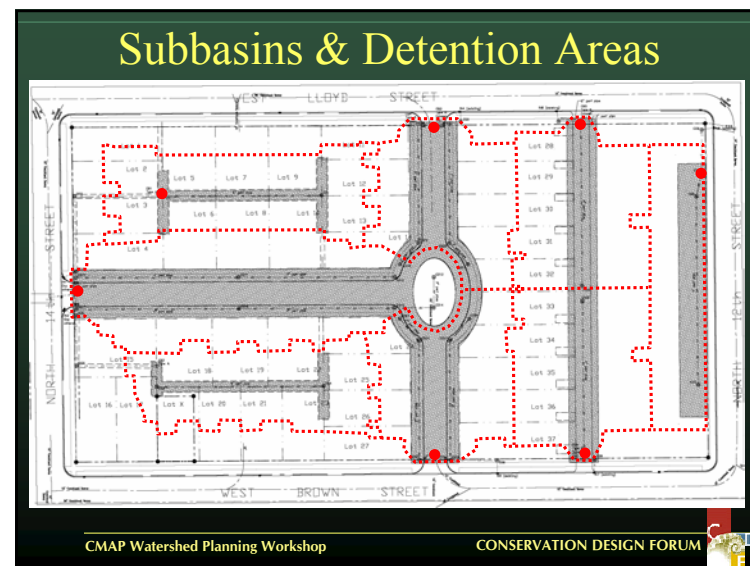
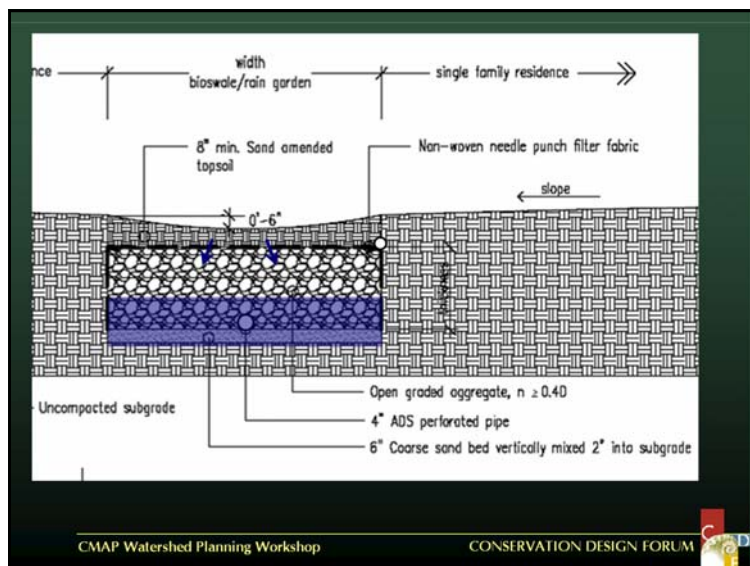
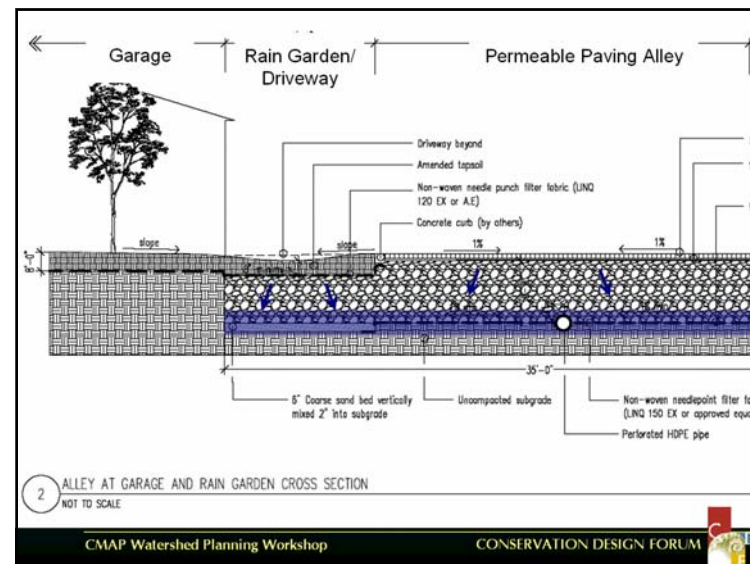
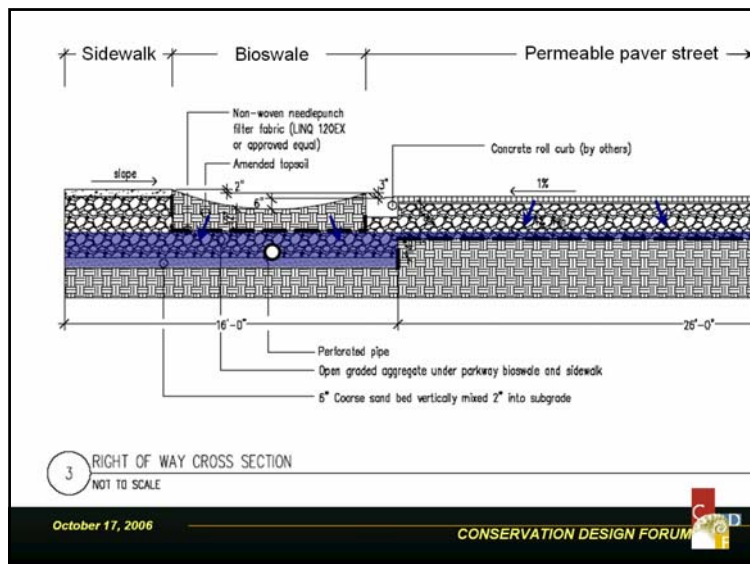
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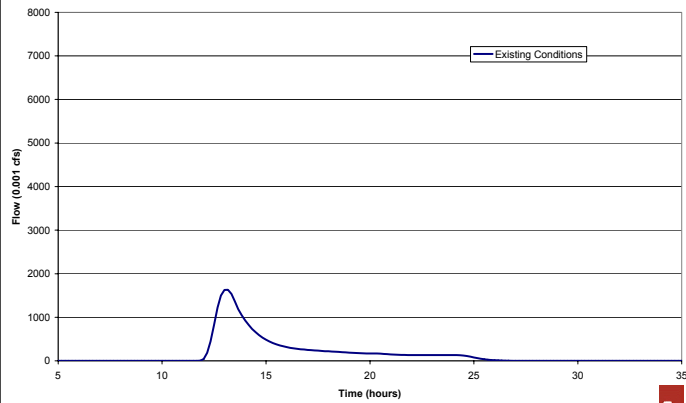








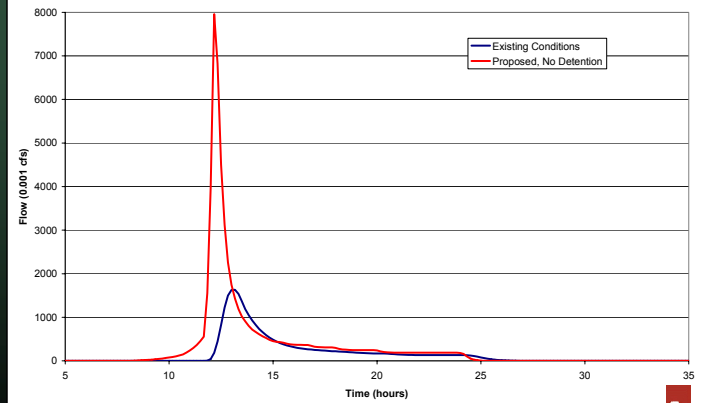
### Josey Heights 2-Year Hydrograph



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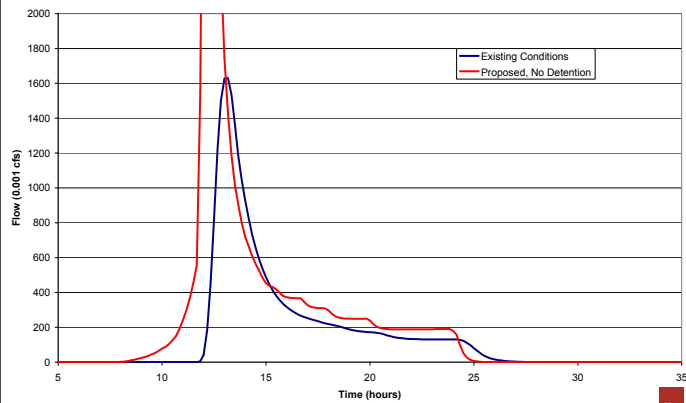
### Josey Heights 2-Year Hydrograph



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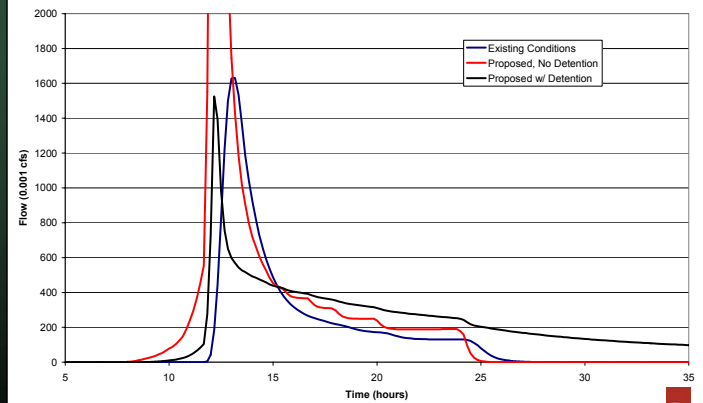
### Josey Heights 2-Year Hydrograph



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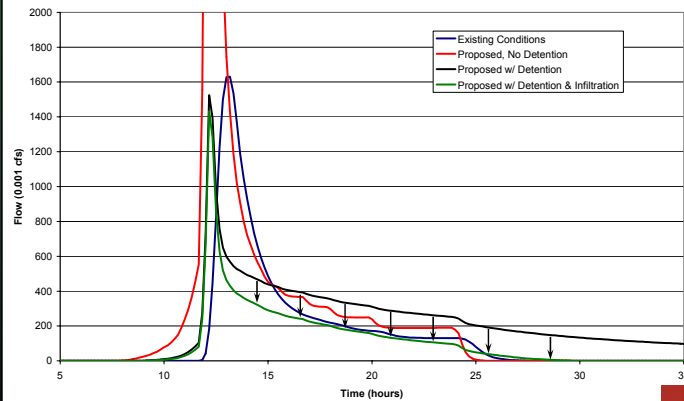


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### Josey Heights 2-Year Hydrograph



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### Estimated Project Performance

Event	24-hour Rainfall	Existing Conditions	Proposed w/o Detention	Proposed w/ Detention
2-yr Flow	-	1.6 cfs	8.0	1.4 cfs
100-yr Flow	-	9.1 cfs	26.1	5.7 cfs
2-yr VDP		4.3 cfs-hrs		4.3 cfs-hrs
100-yr VDP		20.9 cfs-hrs		20.8 cfs-hrs
2-yr Runoff	2.57"	0.65"	1.30"	0.46"*
100-yr Runoff	5.88"	3.08"	4.29"	3.13"*

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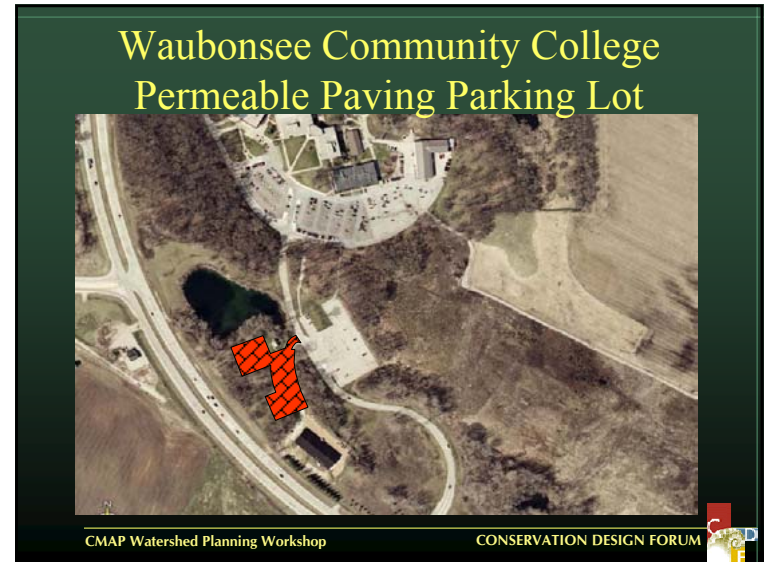
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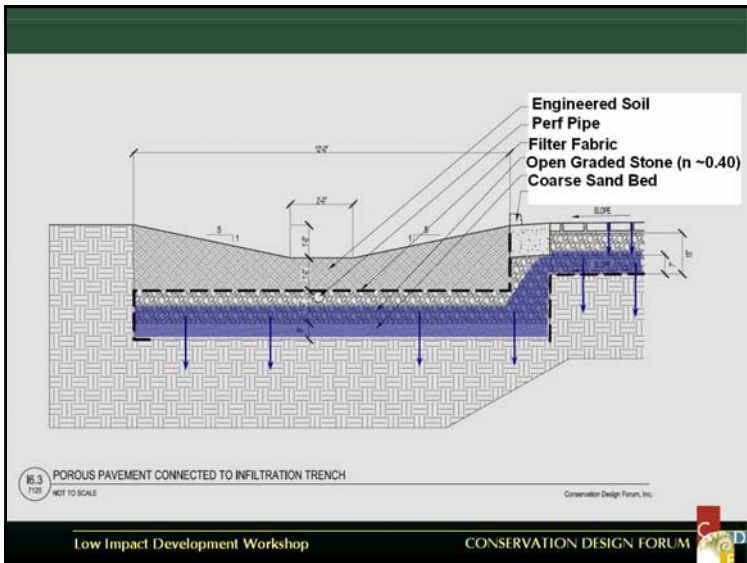
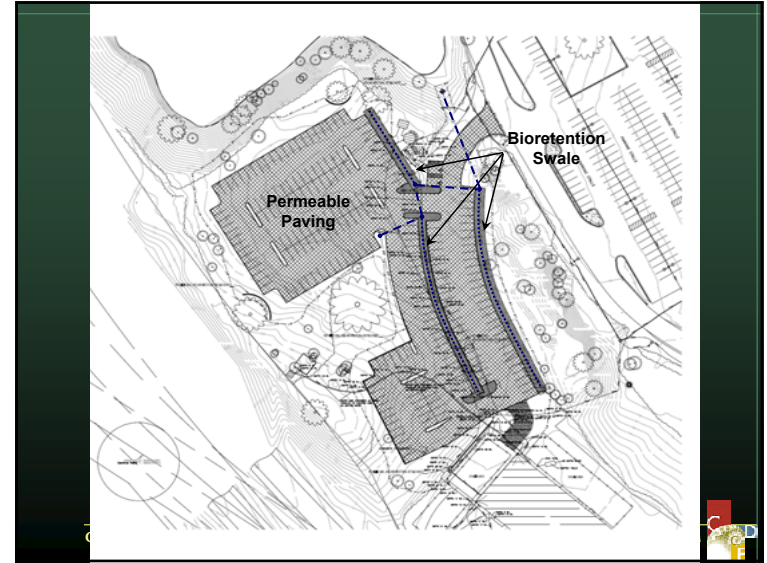


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## Development Costs

Pavers & Gravel	\$36/sy	\$1,300/stall
Pavers, gravel, & curb	\$42/sy	\$1,500/stall
Pavers, gravel, curb, & bioswale	\$40/sy	\$1,650/stall
Total (demo, earthwork, lot, lighting, walls, etc)	\$90/sy	\$3,300/stall

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## Aurora Middle School



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Questions?

[www.cdfinc.com](http://www.cdfinc.com)

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